

REMARKS / DISCUSSION OF ISSUES

Claims 1-13 are presently pending. Claims 1, 9 and 13 are in independent form.

Unless indicated otherwise, claims are amended for non-statutory reasons: to correct one or more informalities, remove figure label number(s), and/or to replace European-style claim phraseology with American-style claim language.

Rejections Under 35 U.S.C. § 103

1. Claims 1,3-5 was rejected under 35 U.S.C. § 103(a) as being obvious in view of *Van Den Meerakker, et al.* (Journal of the Electrochemical Society, 147(7) pages 2757-2761 (2000) and *Gruning, et al.* (U.S. Patent 5,987,208) and *Chen* (U.S. Patent Publication 2003/0091865). For at least the reasons set forth herein, Applicants respectfully submit that this rejection is improper and should be withdrawn.

Analysis of obviousness under 35 U.S.C. §103 requires determination of the scope and content of the prior art, the differences between the prior art, and the claims at issue, and the level of ordinary skill in the pertinent art. *W. L. Gore & Associates v. Garlock, Inc.* 220 USPQ 303, 311 (1983) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (CAFC 1966)). Moreover, there must have been something present in the teachings of the prior art to suggest to one skilled in the art that the claimed invention would have been obvious. *W.L. Gore & Associates* at 311 (citing *In re Bergel* 130 USPQ 206, 208 (CCPA 1961); and *In re Sponnoble* 160 USPQ 237, 244 (CCPA 1969)).

Furthermore, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is a reason, suggestion or motivation do so. The reason, suggestion or motivation may come from references themselves; from knowledge of those skilled in art that certain references or disclosures in references are known to be of interest in the particular field; or from nature of the problem to be solved to do so found in the references themselves or in the

knowledge generally available to one of ordinary skill in the art. *Pro-Mold and Tool Co. v. Great Lakes Plastics Inc.* 37 USPQ2d 1626 (CAFC 1996). Moreover, prior knowledge in the field must be supported by tangible teachings of reference materials. *Cardiac Pacemakers Inc. v. St. Jude Medical Inc.* 72 USPQ 2d 1333, 1336 (CAFC 2004). (Emphasis provided).

However, hindsight is never an appropriate motivation for combining references and/or the requisite knowledge available to one having ordinary skill in the art. To this end, relying upon hindsight knowledge of applicants' disclosure when the prior art does not teach nor suggest such knowledge results in the use of the invention as a template for its own reconstruction. This is wholly improper in the determination of patentability. *Sensonics Inc. v Aerosonics Corp.*, 38 USPQ 2d 1551-1554 (CAFC 1996), citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.* 220 USPQ 303. Moreover, the determination of obviousness cannot be based on the hindsight combination of components selectively culled out from the prior art to fit the parameters of the claims at issue. *Crown Operations International Ltd. v. Solutia Inc.* 62 USPQ2d 1917, 1922 (CAFC 2002).

i. Claim 1 is drawn to a method of manufacturing nanowires from semiconductor material. The method features, *inter alia*: *anodically etching so as to form substantially parallel pores with a pitch corresponding to the pitch of the openings in the etching mask at a current density such that the diameter of the pores becomes at least as great as the pitch of the pores, whereby nanowires are formed.*

Applicants again note that the reference to *Van Den Meerakker, et al.* is drawn to etching macropores in silicon. At page 3 of the present Office Action, the Examiner again concedes that the reference is silent on the fabrication of nanowires. However, the Examiner once attempts to cobble a rejection, which Applicants submit is based on unsubstantiated assertions. Notably, the Office Action states:

A difference is noted between applicants claim 1 and the reference of Van Den Meerakker cited above, Van Den Meerakker is silent about the diameter of the pores becomes at least as great as the pitch of the pores, whereby nanowires are formed.

However, Van Den Meerakker provide the basic process steps of the fabrication process which will also result in the formation of nanowires when the mask design is modified allowing the etching to be carried out such as the diameter of the pores "the pattern with hexagonal array", (page 2757, paragraph "Experimental"), is large enough

to allow intersection of the pores leaving narrow regions between pores which will become the "nanowires" formed on the semiconductor material (silicon wafer), such a design concept is illustrated by Chen, in using a design pattern for forming nanowires, where "The pattern of nanodots 12 can be notionally divided into hexagonal clusters 14 of seven neighbouring nanodots. As shown in FIG. 1a(ii), the seven neighbouring nanodots of each cluster overlap with one another to form six wells 16" (page 3, paragraph 0045). Clearly, Chen illustrates the design concept of forming small wells (16) from intersecting regular repeating patterns (12). One of ordinary skill in the art would have found it obvious to reverse the pattern on Chen for forming seven neighbouring nanoholes of each cluster overlap with one another to form six islands by using the negative of Chen's masking pattern.

i. *Van Den Meerakker, et al.* fails to disclose nanowires

The Office Action concedes that the reference to *Van Den Meerakker, et al.* does not disclose nanowires. However, in the second paragraph, the Examiner concludes that all the necessary fabrication steps are provided in the disclosure of this reference to arrive at a result that is not even mentioned therein. Respectfully, Applicants submit that by concluding that the disclosure of a method will result in the nanowires that are not even

mentioned, the Examiner is concluding that the scientist authors of this scholarly article have realized a result that they themselves did not even realize that they had. The undersigned submits with strong conviction that the Examiner is mistakenly relying upon hindsight knowledge of applicants' disclosure when the prior art does not teach nor suggest such knowledge and the use of the rejected claims as templates for their own reconstruction. To this end, if the authors did not teach or suggest the fabrication of nanowires, what basis besides the use of hindsight knowledge of the claims under examination could lead the Examiner to conclude that the reference discloses the nanowires. Clearly, the Examiner is applying hindsight, which is **wholly improper in the determination of patentability**.

ii. The Examiner has again applied impermissible hindsight in the rejection

Claim 1 also recites: "etching takes place in the second period at a higher current density than in the first period so that the nanowires formed have a greater diameter in the first region than in the second region, with the result that the nanowires break off in the second region upon removal."

As stated previously, the Examiner turns to *Gruning, et al.* for the disclosure of the above-noted features of claim 1. This reference may relate to electrochemical etching using different current densities, but the reference fails to disclose the fabrication of nanowires; or that the diameter of nanowires in a second region is smaller than in a first region to facilitate breaking off of the nanowires in the second region. Furthermore, at page 4 of the Office Action, in the penultimate paragraph, the Examiner supplies motivation for narrowing the diameter of the nanowires to facilitate breaking off the nanowires. However, there is no evidence in support of this motivation. As such, and for reasons similar to those provided above, Applicants submit that this rejection is improper for lacking proper motivation to combine the references.

Moreover, Applicants respectfully submit that the Examiner has applied impermissible hindsight in the rejection of claim 1. To this end, the references to *Van Den Meerakker, et al.* and *Gruning, et al.* relate to etching of deep macropores and an

optical structure suitable as an optical waveguide or cavity formed by electrochemical etching, respectively. Neither reference discloses fabrication of nanowires. As such, Applicants respectfully assert that the Examiner has cobbled a rejection using Applicants claim 1 as a template for its reconstruction; and in each instance that a feature of the claim is not disclosed in the references, the feature is discounted as being obvious.

iii. The Office Action alleges a basis for rejection with no citation of the disclosure in the applied art

One of the steps of claim 1 includes **removing the nanowires from the substrate by means of vibration**. The Examiner asserts:

The concept of providing a weak structural region where a breaking point is intended is conventionally used in designing break point. One of ordinary skill would have been motivated to narrow the nanowires diameter at the base in order to have an easy break-off point when applying mechanical stress such as ultrasonic vibration when separation of the nanowires from the substrate is desired.

The Examiner is alleges that the providing of one condition (weak structural region) is obvious from the teachings of the applied art; and that one skilled in the art would be motivated to provide this structure to facilitate separating nanowires by a technique that is not disclosed or suggested in the applied art. Thus, the Examiner is asserting that an undisclosed, un-suggested fabrication step would have been obvious because the alleged resultant (weak) structure supposedly is amenable to the application of this undisclosed, un-suggested step. Respectfully, Applicants maintain that this is again the application of hindsight to a supposition in hindsight. Such logic cannot be embraced in the determination of patentability.

iv. The Examiner applies hindsight in the assertion that the formation of nanowires is obvious in view of *Chen*

Chen discloses "In the next step of the method, shown schematically in FIG. 3c, magnetic material is deposited into the nanoholes 40 by means of electroplating,

sputtering or evaporation (or any other suitable means known to persons skilled in the art). It is preferred that electrodeposition is used because this method can efficiently fill the relatively large aspect ratio nanoholes 40 with continuous metal nanowires.”

Thus, Chen forms metal nanowires by filling holes with electrodeposited magnetic material. The Examiner asserts that one skilled in the art would have found it obvious to reverse the process of *Chen* to arrive at claim 1. To wit, that one skilled in the art would have found it obvious to use the negative of *Chen*’s masking pattern to form the nanowires. Applicants submit that *Chen* does not disclose the reverse of the method as claimed, but rather the opposite of what is claimed. To this end, *Chen* uses nanodots as forms or molds for nanowires; whereas, Applicants form nanowires from the etched features. This is the opposite of what is disclosed in *Chen*. Respectfully, the undersigned is unaware of any basis in law supporting a rejection for obviousness by applying art that teaches the opposite of that which is claimed as being within the purview of one of ordinary skill in the art. Rather, basic reasoning in the law as it relates to obviousness rejections would serve to support that the opposite of a claim feature is not obvious in view of the feature.

In the sections above, Applicants have traversed some, but not all of the grounds of rejection of claim 1. Applicants reserve their right to raise any further rebuttals of the Examiner’s position in further and future correspondence, if necessary.

Claims 3-5 depend from claim 1 and are patentable as a matter of law.

2. Claim 2 was rejected under 35 U.S.C. § 103(a) as being obvious in view of *Van Den Meerakker, et al.* in view of secondary, tertiary and quaternary references. Claim 2 depends from claim 1. While in no way conceding as to the propriety of these rejections, Applicants respectfully submit that claims 2 is patentable over the applied art at least because of their dependence on claim 1.

The Office Action addresses substantively claims 3-5 and 8-11 in this portion of the rejection. Claims 3-5 and depend from claim 1; claim 9 is independent and claims 10-11 depend from claim 9.

Claim 9 features: *A dispersion of nanowires of a semiconductor material in a dispersing agent, which nanowires are provided with a surface layer of a desired material.*

The applied art to *Van Den Meerakker, et al.* is improperly applied; and the remaining references of the rejection fail to teach or suggest the features of claim 9. Notably, *Chen* fails to disclose semiconductor nanowires; and *Kish, et al.* fails to disclose nanowires at all. Therefore, a *prima facie* case of obviousness cannot be established at least due to the shortcomings of the disclosures of the applied art. Therefore, claim 9 and the claims that depend therefrom are patentable.

3. Claims 6-13 were rejected under 35 U.S.C. § 103(a) as being obvious in view of *Van Den Meerakker, et al.* in view of additional references. Claims 6-8 and 11-12 depend indirectly from claim 1. While in no way conceding as to the propriety of these rejections, Applicants respectfully submit that claims 6-8 and 11-12 are patentable over the applied art at least because of their dependence on claim 1. Applicants reserve their right to raise substantive arguments in support of the patentability of claims 6-8 and 11-12 in future replies, if necessary.

The rejection of claim 13 relies on *Van Den Meerakker, et al.* in much the same way as the rejection of claim 1, and is substantially identical to the rejection set forth in the Office Action of September 27, 2006. Applicants maintain their position, which is restated presently.

Claim 13 is drawn to an electronic device and not a method of manufacture. Moreover, the Examiner provides no basis for the assertions that dispersion can be used in the manufacture of any electronic device comprising a layer in which nanowires are dispersed. By similar reasoning as provided in the response to the rejection of claim 1, Applicants submit that no evidence to support the suggested modification of *Van Den Meerakker, et al.* has been provided. Accordingly, without the required evidence in support of the suggested modification, this rejection is improper and should be withdrawn. Again, if the allegations of knowledge in the field is based on the Examiner's

personal knowledge, Applicants respectfully request that an affidavit under 37 C.F.R. § 1.104(d)(2) be provided.

Conclusion

In view the foregoing, applicant(s) respectfully request(s) that the Examiner withdraw the objection(s) and/or rejection(s) of record, allow all the pending claims, and find the application in condition for allowance.

If any points remain in issue that may best be resolved through a personal or telephonic interview, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Respectfully submitted on behalf of:

Phillips Electronics North America Corp.



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